

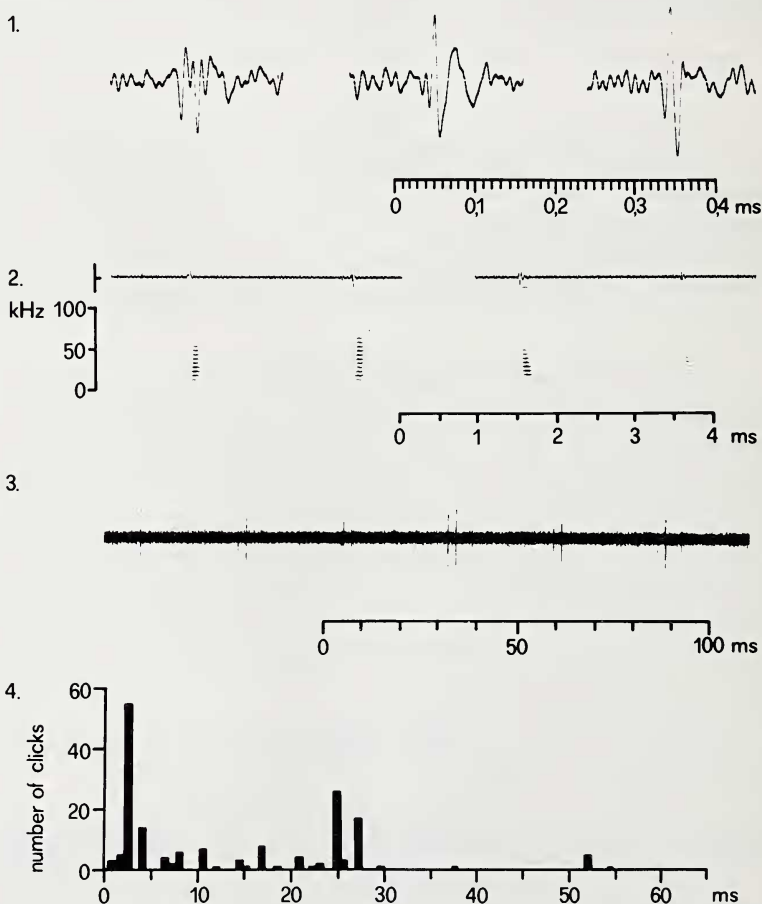
## Echolocation signals confirmed in rats

By MARIA-TH. KALTWASSER and H.-U. SCHNITZLER

*Receipt of Ms. 15. 5. 1981*

In connection with studies of the acoustical communication behavior of rats it was tested whether rats produce ultrasonic signals which they could use for echolocation.

In a dark room one animal was put on a small platform high above the ground so that it was almost impossible to get down. The rat was observed by means of a residual light intensifier. With a wide band recording system (15–80 kHz) sounds were recorded when the animal's head moved across the edge of the platform pointing towards a microphone installed below its edge.



*Fig. 1-4.* Ultrasonic pulses produced by rats. 1 = Oscillogram of single clicks; 2 = Spectrogram of paired clicks made by a real time spectrum analyzer with a frequency resolution of 5.12 kHz; 3 = Typical pattern of clicks; 4 = Histogram showing number of clicks as a function of click-intervals

The only sounds recorded in this situation are very short clicks with a duration of 0.08 ms similar to those found by CHASE (1980). These broadband signals are of low intensity and consist of only 3–4 cycles (Figs. 1.1 and 1.2). Clicks predominantly occur in intervals of about 2, 25 and 52 ms thereby creating the impression that they are grouped in double pulses of 2 ms intervals which have a basic period of about 27 ms. Sometimes one pair of clicks is missing thus creating an interval of about 52 ms between two paired clicks (Figs. 1.3 and 1.4). Within a period of 2.56 seconds 183 clicks were recorded. That is an average of 70 clicks per second. These clicks were compared to those found by CHASE (1980) when blind, water-deprived rats discriminated the open channel of an elevated Y-maze from the closed one. In this situation the rats emitted signals consisting of 4–8 cycles appearing in trains of sometimes 30 clicks or more. The occurrence of double pulses similar to paired clicks of other echolocators (HENSON and SCHNITZLER 1980) was also reported. The emission of these signals was recorded predominantly when the tested animal succeeded in searching for water without error. CHASE (1980) suggested that the signals described above are “used by the rat as part of an active echolocation system”.

There is an evident similarity between the signals recorded by CHASE and those found in our experiments. This similarity and the fact that these signals were produced in a situation when the animal explored an unknown area below the platform confirms again the hypothesis – first set up by ROSENZWEIG et al. (1955) – that rats may use these sounds for echolocation.

#### References

- CHASE, J. (1980): Rat echolocation: Correlations between object detection and click production. In: Animal Sonar Systems. Ed. by R. G. BUSNEL and J. F. FISH. New York: Plenum Press. 875–877.  
 HENSON, Jr., O. W.; SCHNITZLER, H. U. (1980): Performance of airborne biosonar systems: II. Vertebrates other than Microchiroptera. In: Animal Sonar Systems. Ed. by R. G. BUSNEL and J. F. FISH. New York: Plenum Press. 183–195.  
 ROSENZWEIG, M. R.; RILEY, D. A.; KRECH, D. (1955): Evidence for echolocation in rats. *Science* **121**, 600.

*Authors' address:* MARIA-TH. KALTWASSER and Prof. Dr. H. U. SCHNITZLER, Universität Tübingen, Lehrstuhl Zoophysiologie, Institut für Biologie III, Auf der Morgenstelle 28, D-7400 Tübingen 1

## Listeriosis killing wood lemmings, *Myopus schisticolor* Lilljeborg

By U. SKARÉN

*Receipt of Ms. 18. 6. 1981*

In autumn 1980 wood lemmings (*Myopus schisticolor*) were housed in an enclosure of about 8 m<sup>2</sup> in Sonkajärvi, Central Finland. In late October some animals appeared to be ill moving unsteady the eyes glimmering deep in the rumpled fur. So all 19 lemmings were taken into room temperature.

However, over 50 % of the animals died within two weeks. When one still healthy looking individual was put into another cage, the disease spread there, too. By early December only two animals of the original 19 lemmings were left. Next spring one of these was successfully delivered of two litters.